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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/578,912	05/09/2006	Keiichirou Kai	1034232-000038	4449

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BUCHANAN, INGERSOLL & ROONEY PC  
POST OFFICE BOX 1404  
ALEXANDRIA, VA 22313-1404

EXAMINER
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BLAND, LAYLA D

ART UNIT	PAPER NUMBER
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1623

NOTIFICATION DATE	DELIVERY MODE
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07/08/2008

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ADIPFDD@bipc.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/578,912	<b>Applicant(s)</b> KAI ET AL.	
	<b>Examiner</b> LAYLA BLAND	<b>Art Unit</b> 1623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 April 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4/4/2008</u> .  | 6) <input type="checkbox"/> Other: _____                          |

### DETAILED ACTION

This office action is a response to Applicant's amendment submitted April 4, 2008, wherein claim 1 is amended and claim 2 is canceled.

The following rejection of record in the previous Office Action is maintained.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. (Org. Biomol. Chem., 2003, 1, 2833-2839, July 9, 2003) in view of Gross et al. (J. Am. Chem. Soc. 1983, 105, 7428-7435).

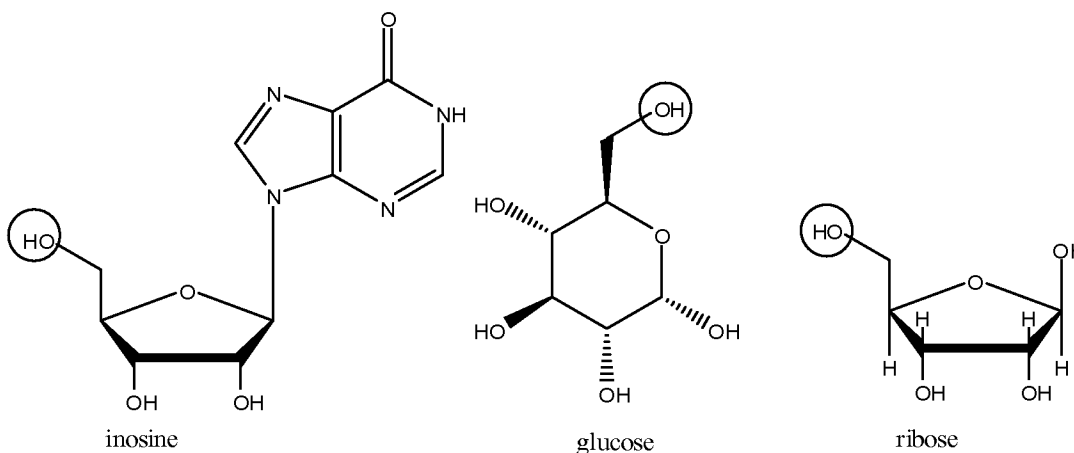
Tanaka et al. teach the phosphorylation of inosine to inosine-5'-monophosphate by acid phosphatases from *Shigella flexneri* [page 2834, second paragraph]. The enzyme also mediates the phosphorylation of glucose to glucose-6-phosphate using pyrophosphate as the phosphate donor [page 2835, last paragraph]. The specific activity of acid phosphatase derived from *Sh. flexneri* was 40 U mg<sup>-1</sup> [page 2834, first paragraph]. In the enzymatic phosphorylation of inosine, 40mM inosine, 100mM disodium pyrophosphate, and 0.1-1µM of enzyme solution in a total volume of 1 ml was used [page 2838, last paragraph]. For the glucose phosphorylation, the reaction

mixture contained 1  $\mu$ M PhoN, 100mM glucose and 100mM disodium pyrophosphate in 100mM sodium acetate [page 2839, first paragraph].

Tanaka et al. do not teach the phosphorylation of a free pentose.

Gross et al. teach the use of ribose-5-phosphate as an intermediate in the synthesis of nucleotides, histadine and tryptophan [page 7428, first paragraph].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to prepare a pentose-5-phosphate ester using acid phosphatase from *Shigella flexneri* in the presence of pyrophosphate. Tanaka et al. teach the selective phosphorylation of inosine (a nucleoside derived from a pentose) and glucose (a hexose). The skilled artisan would expect the corresponding reaction to proceed on a pentose in a substantially same or similar fashion because the structure of a pentose such as ribose is very similar to the structures of inosine and glucose with respect to the reaction sites, seen circled below. The skilled artisan would have been motivated to prepare a pentose-5-phosphate ester because such compounds are useful intermediates in nucleotide synthesis, as taught by Gross et al.



### ***Response to Arguments***

Applicant argues that, although selective phosphorylation of glucose is known, the skilled artisan would not expect the reaction to work for a pentose because substrate specificity of enzymes is unpredictable and glucose differs by one carbon from a pentose. Applicant references Xu et al. and Hansen et al., which illustrate differences in substrate specificity for glucose versus mannoheptulose and for different hexoses. This argument is not persuasive because Tanaka does teach the reaction on a five carbon substrate as well as a six carbon substrate.

Applicant argues that the presence of hypoxanthine is important for the recognition of inosine as a substrate, and cites Ishikawa et al. This is not persuasive for two reasons. First, Tanaka teaches that the reaction proceeds on glucose, in the absence of hypoxanthine. Second, the enzyme studied by Ishikawa is that from *Escherichia blattae*, which is not the same enzyme as that taught by Tanaka. Furthermore, in the second paragraph of page 542, Ishikawa states that "there is little interaction between the enzyme and the inosine base." Ishikawa further states that the enzyme was modified in order to induce a base-enzyme interaction.

Thus, Applicant's arguments are not persuasive and the rejection is maintained.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAYLA BLAND whose telephone number is (571)272-9572. The examiner can normally be reached on Tuesday - Friday, 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anna Jiang can be reached on (571) 272-0627. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Shaojia Anna Jiang, Ph.D./  
Supervisory Patent Examiner, Art Unit 1623

/Layla Bland/  
Examiner, Art Unit 1623